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termination of the magnitude of certain electric quantities, and their relations to each other." The Cavendish physical laboratory was not opened until 1874. Maxwell died in 1879, five years later. In this short term of office he left the impress of his genius upon the scientific work of Cambridge. Sir William Thomson has said, "There is, indeed, nothing short of a revival of physical science at Cambridge within the last fifteen years, and this is largely due to Maxwell's influence." We have said that no one can thoroughly appreciate the genius of the man who has not read his treatises on

electricity, on heat, and his various essays, which are soon to be collected and published.

His life, with its great expressions of reverence for higher things and its respect for true scientific work, is one to ponder over; and his correspondence is rich in literary suggestions, and enlivened by the play of humor. It will always be a source of gratification to Americans to know that the American academy of arts and sciences and the American philosophical society were the first of the foreign scientific societies to elect Maxwell a foreign honorary member.

WEEKLY SUMMARY OF THE PROGRESS OF SCIENCE.

MATHEMATICS.

The polar quadrilateral.—Given a conic and a polar quadrangle: the five quadrilaterals got by taking the poles of its vertices, or the pole of one vertex and the lines joining the other three, are polar quadrilaterals such that conics circumscribing their diagonal triangles osculate the given conic in the same six points. S. Kantor gives a geometrical proof of this theorem by showing that the six points in which a conic inscribed in a quadrilateral can be made to touch the given conic are the same for the five quadrilaterals, and that any one of the triply infinite number of conics with respect to which a fixed quadrilateral is polar osculates other conics of the system in the same six points in which it is touched by conics inscribed in the quadrilateral. He points out an application of the latter property to the determination of the points of inflection of the unicursal quartic obtained by a quadric transformation of the conic. — (*Math. ann.*, xxi. 299.) C. L. R. [754]

Theory of functions.—The second part of a paper by Rausenberger treats of single valued functions with non-interchangeable periods. It is not convenient here to do more than refer to this paper, as a review of it can hardly be given without introducing a good deal of algebraical work. The paper, however, as introducing a certain number of new and interesting ideas, is decidedly worthy of consideration. — (*Math. ann.*, xxi.) T. C. [755]

Impact of billiard-balls.—M. Resal has generalized some of the results obtained by Coriolis in his *Théorie analytique des effets du jeu de billard*. Coriolis has considered the two balls as being homogeneous, and possessing identical properties in every respect. M. Resal takes account of possible differences in the masses of the two balls, and in their moments of inertia with respect to a diameter, — two properties which might interfere very seriously with the play of even a skilful player. One of the principal results obtained by M. Resal is, that, during the instant of impact, the direction of the friction is not constant. The contrary was assumed by Coriolis. — (*Comptes rendus*, Oct. 16, 1882.) T. C. [756]

PHYSICS.

Acoustics.

Vibrations of membranes.—A. Elsas has studied the vibrations of both square and circular membranes, exciting them by connecting the middle of

the membrane with a tuning-fork by means of thread, attaching the thread to the membrane with sealing-wax. The nodes and loops were determined in the usual manner by the use of sand and lycopodium powder. Thirty different forks were used, and a great variety of membranes. The sound-figures showed a gradual change from one mode of vibration to another as the pitch of the fork was changed, thus verifying the results of Savart. — (*Beibl. ann. phys. chem.*, No. 2, 1883.) C. R. C. [757]

Photography of sound-vibrations.—Boltzmann has studied the vibrations of a plate actuated by the voice, using a method similar in many respects to that employed several years ago by Prof. Blake of Providence. A thin platinum plate was attached perpendicularly to the iron plate; and, by an application of the principle of the photophone, it was shown to vibrate in the same manner as the iron plate. By means of a solar microscope, an image of the shadow of the platinum plate was thrown upon a screen, the straight bounding-line of the shadow being condensed by a cylindrical lens. The screen was then replaced by a sensitized plate, moved rapidly at right angles to the line of light produced by the cylindrical lens, while the iron plate was made to vibrate by the voice. The bounding-line between light and shadow on the plate formed a curve whose nature varied according to the sound uttered. The curves due to the vowels are simple; those due to consonants, much more complex. — (*Phil. mag.*, Feb.) C. R. C. [758]

Optics.

Conditions of sight which affect accurate shooting.—Formerly the sight of a soldier as regards shooting was a matter of little consideration; but with the introduction of the Martini-Henry and other rifles, which are accurate at 1,500 yards, sound eyesight becomes an important element. Dr. Litton Forbes, surgeon-major in the Servian war, discusses the various changes taking place in the eye by which the sight is affected, and proposes to correct defective vision by means of a stenopæic sight-adjuster. This consists of a disk of colored glass, perforated with a pin-hole aperture, having a correcting-lens of colorless glass cemented to its back. The whole is to be worn in a spectacle-frame. — (*Journ. roy. united service inst.*, no. 118, 1882.) C. E. M. [759]

A new optical phenomenon.—Axenfeld describes the conditions of an experiment in which straight lines, a little on the near or far side of the

distance for which the eye is focused, appear curved. The explanation of the phenomenon is essentially the same as that of 'Scheiner's experiment.' The author suggests that it may be employed in the construction of an optometer. — (*Pflüg. archiv*, xxx. 288.) H. N. M. [760]

Heat.

Thermometry. — In a recent communication Prof. Cleveland Abbé has reviewed the subject of the determination of the temperature of the air at a given locality, and described an original device. Beginning with the simple hanging of the thermometer in the open air, he proceeded to describe and point out the defects of the various methods of exposure of the past and present, — the thermometer in the shade, the Glaisher screen, the Stevenson screen and double-louvre screens in general, the double metallic cylinder shelters of Jelinck and Wild, the silver-thimble screen of Regnault, the whirling thermometer of Saussure and others, and Joule's method. The method devised by himself in 1865, and practised for a short time at Pulkova, consisted in constructing a very perfect louvre screen, within which were established black-bulb and bright- or silvered-bulb thermometers. One of these was greatly influenced by radiations from the surrounding screen, and the other very little; and the difference of their readings enabled the effect of radiation to be computed and eliminated. Provided the theory of the action of the bright and black bulbs is perfectly understood, they can be employed in conjunction by meteorologists and physicists without a screen, and even in sunlight.

The formula used for reduction at Pulkova was

$$t_a = t_s + c(t_b - t_s),$$

in which t_a is the temperature of the air, t_s and t_b are the readings of the bright-bulb and black-bulb thermometers, and c is a co-efficient to be determined experimentally for each pair of instruments. Quite recently Prof. William Ferrel has made a theoretic investigation of the co-efficient, showing that it is not strictly constant, but varies with the velocity of the air-current passing the bulbs. Representing by r_s and r_b the radiating powers of the bright and black bulbs, by B , B' , and B'' , certain constant co-efficients depending on the size, conductivity, and specific heat of the bulbs, and by v the velocity, he writes the full formula thus: —

$$t_a = t_s + \frac{1 + \frac{B r_b}{B' + B'' v}}{\frac{r_b}{r_s} - 1} (t_b - t_s).$$

— (*Phil. soc. Wash.*; meeting March 24.) [761]

Electricity.

Determination of surface of winding. — F. Himstedt gives a method of determining experimentally the *windungsfläche* of a bobbin by suspending it in the magnetic meridian, and comparing the deflection due to a given current with that due to another current in a coil whose constants can be directly measured. By hanging the two coils rigidly connected upon the same suspension, and passing the current first in the same and then in opposite directions through the coils, he obtains

$$\frac{S + s}{S - s} = \frac{I' \tan \phi}{I \tan \phi'},$$

where ϕ represents the deflection when the current is in the same direction. This formula renders necessary only the measurement of four angles. The paper of F. Kohlrausch which suggested this is given in

full in *Ann. phys. chem.*, iv. — (*Ann. phys. chem.*, iii.) J. T. [762]

Telephony. — At a recent meeting of the Society of telegraph engineers and of electricians, J. Munro described some new forms of microphonic transmitters. Among them was one consisting of two pieces of wire gauze held together by a magnet. In another form the microphonic contact was between the links of a short stretched chain. No details of practical trials are given. Mr. Stroh described an experiment in which he showed, by the use of a mirror and screen, that, in the case of one carbon cylinder resting across another, the upper one was raised $\frac{1}{2,000}$ mm. during microscopic contact. — (*Electrician*, March 17.) J. T. [763]

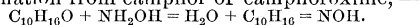
The Ayrton and Perry erg-meter. — Professor Perry gives a proof of the principle of the erg-meter, which measures the work done by a current by means of its electro-magnetic retardation upon a pendulum-bob. — (*Ibid.*) J. T. [764]

Conti's system for neutralizing induction. — One of two parallel wires is bent upon itself at one point of its course into a long, rectangular loop. The current in the outer side of this rectangle is opposite to that in the straight part of the wire, and may be brought near enough to a neighboring line to neutralize the mutual induction. — (*Electr. rev.*, Feb. 24.) J. T. [765]

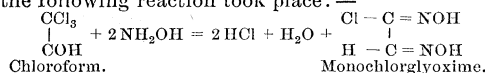
CHEMISTRY.

(Organic.)

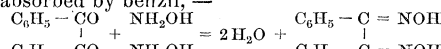
The hydroxylamine reaction. — Generalizations of this reaction are still in progress in the laboratory of V. Meyer. E. Nägeli obtained from mesityloxide, mesityloxime ($C_6H_3O=N O H$); from phoron, phoroxime ($C_9H_{14}=N O H$); from allylacetone, allylacetoxime ($C_6H_{10}=N O H$); and from suberone, suberoxime ($C_7H_{12}=N O H$). Of still greater interest was the formation from camphor of camphoroxime, —



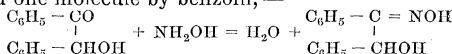
This reaction is a strong indication of the ketone character of camphor. Hydroxylamine was without action upon borneol and menthol. With chloroform the following reaction took place: —



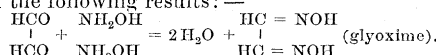
Max Wittenberg and V. Meyer employed the hydroxylamine reaction to prove the constitution of benzil and benzoin. If the formulae hitherto accepted are correct, two molecules of hydroxylamine should be absorbed by benzil, —



and one molecule by benzoin, —

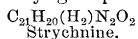


On trial it was found that one molecule only of hydroxylamine entered into the reaction in either case. To make sure that hydroxylamine acts the same upon the group $-CO-CO-$ as upon the group $-CO-CH_2-$, the reaction was tested with glyoxal, with the following results: —



Benzil cannot, therefore, be a substituted glyoxal. These investigations will be continued in different directions to determine which of several possible formulae represents its constitution. — (*Berichte deutsch. chem. gesellsch.*, xvi. 494, 500.) C. F. M. [766]

The alkaloids of nux vomica.—On heating brucine in sealed tubes with concentrated hydrochloric acid, W. A. Shenstone found that the tubes opened with great pressure, and that methyl chloride escaped in large quantity. The formula of brucine may be regarded as derived from that of strychnine, by replacing two hydrogen atoms in the latter by two methoxyl groups:—



For the purpose of testing this hypothesis, the decomposition with hydrochloric acid was performed on a quantitative basis, which gave 79 per cent of the amount required for two methoxyl groups. When the contents of the tubes were dissolved in water, alkalies precipitated a base which proved to be too unstable for examination. The results obtained with hydriodic acid were still less satisfactory. Experiments will be next tried with strychnine. — (*Journ. chem. soc.*, ccliii. 101.) C. F. M. [767]

Certain substituted acrylic and propionic acids.—Dr. C. F. Mabery described several acids belonging to these series, which he had obtained in various ways. By the addition of chlorine to β -dibromacrylic acid, a dichlorodibrompropionic acid ($\text{CBr}_2\text{Cl} - \text{CHCl} - \text{COOH}$) was formed, which will be designated as the γ -acid, to distinguish it from the α - and β -dichlorodibrompropionic acids previously investigated. A molecule of hydrobromic acid was removed from the γ -acid by the action of aqueous baric hydrate, with the formation of a dichlorobromacrylic acid ($\text{CBrCl} = \text{CHCl} - \text{COOH}$). In like manner, from the α - and β -acids, baric hydrate removed hydrobromic acid, giving the corresponding substituted acrylic acids, whose structure is yet to be determined. It was hoped that a chlorine addition-product of brompropionic acid could be formed, since it would serve as a means of comparison; but on trial it was found that four chlorine atoms were taken up, instead of two, forming tetrachlorobrompropionic acid ($\text{CBrCl}_2 - \text{CHCl}_2 - \text{COOH}$); melting-point, 225°. Chlorine was also absorbed by chlorbromacrylic acid. From the resulting trichlorobrompropionic acid ($\text{CBrCl}_2\text{Br} - \text{CHCl} - \text{COOH}$) baric hydrate eliminated hydrobromic acid, with the formation of trichloracrylic acid ($\text{CCl}_2 = \text{CHCl} - \text{COOH}$). These substances will be submitted to further study. — (*Harvard chem. club*; meeting April 24.) [768]

AGRICULTURE.

Rancid butter.—According to Hagemann, the peculiar properties of rancid butter are due to the presence of free butyric acid, and other volatile fatty acids. These are set free from the glycerides of the butter by the action of the lactic acid arising from the fermentation of the small quantity of buttermilk retained by the butter. That the liberation of butyric acid itself is not due to a fermentative action, was shown by the fact that all attempts to render butter rancid by adding to it the butyric ferment failed, and also by the fact that rancid butter failed to infect fresh butter. That the explanation given above is an adequate one, was shown by mixing both lactic acid and other dilute acids with butter or with pure butter-fat, the fat speedily becoming rancid in all cases. The same effect was produced on artificial butyrim. To prevent butter from becoming rancid, the buttermilk should, in the first place, be removed as thoroughly as practicable. In the second place, any thing which will prevent the lactic fermentation will, of course, remove the cause of the evil. The author does not enter into a consideration of the most suitable means of doing this, further than to

point out that acids (such as salicylic acid) are not applicable, since they themselves are liable to act on the fat, and render it rancid. — (*Landw. vers. stat.*, xxviii. 201.) H. P. A. [769]

Ropy milk.—Schmidt finds that the ropiness of milk, which is sometimes observed, is caused by the action of a microscopic organism, which he describes, upon the milk-sugar. The same organism acts also upon cane and grape sugar and on mannite, converting them into a substance resembling vegetable mucilage in its properties. Small quantities of acid are produced, but no carbon dioxide. The fermentation appears to resemble, if not to be identical with, the mucilaginous fermentation of wine. The organism acts most energetically at 30°–40° C., and is destroyed by heating the fluid containing it to 60° C. or over. Freezing does not destroy it; and, if dry, it withstands a temperature of 100° C. Only comparatively large quantities of antiseptics prevent its action. — (*Landw. vers. stat.*, xxviii. 91.) H. P. A. [770]

GEOLOGY.

Geology of Brazil.—Professor Edward D. Cope made a communication based upon a collection of vertebrate fossils from Brazil, recently placed in his hands for study. As his examination of the material was not yet completed, he could only allude to the leading points of interest in connection with the geology of the United States and western Europe. The localities in which the fossils in hand were found are all south of the Amazon River. The eastern and western ranges of mountains correspond to our Alleghany and Rocky Mountains, and are approximately of the same age. A cretaceous formation is found in the neighborhood of Pernambuco. There are bare fossiliferous deposits near Sergipe, while the beds near Bahia are evidently lacustrine. The fossils from Pernambuco include several genera of sharks, and a genus of crocodiles identical with *Hyposaurus* of New Jersey. There is found with these a fine genus of rays, the teeth of which were described. These genera indicate this cretaceous formation to be near the top of the series, corresponding to the Maestricht chalk, or our number 5. At Maroim was found a new species of fish of the genus *Pycnodus*. He believed it to belong to the order *Isospondyli*; although it is very different in general form from the herrings, salmons, and other recent fishes belonging to the order. The form of the basilar bone of the pectoral fin, which the speaker considered of first-rate importance as indicating the relationship of the genus, was observed, and indicated that the position assigned was the correct one. The region about Bahia furnishes many fishes and saurians, but no cretaceous mammalia have as yet been discovered. There are two species of herring, — a small one, six inches long; and a large one, two feet long, resembling *Hyodon* and *Chirocentrus*. Crocodiles and dinosaurs are abundant, the former indicating higher beds than those at Pernambuco. A gavial resembling *Holops* of the New-Jersey cretaceous No. 5 was also found in these beds, which may be said to represent the Laramie deposits of the western United States. A tertiary horizon in Bahia has so far produced but one fossil, — a new species of *Toxodon*. The age is pampean. In San Paulo the beds seem to be Permian, and have yielded one batrachian form, which may, however, be carboniferous. The head bones of a large fish, the locality of which was not known, were also described. During the pliocene period the vertebrate fauna of Brazil was very distinct from that of North America; but the fossils now being studied

indicate a marked similarity in earlier periods. — (*Acad. nat. sc. Philad.; meeting April 10.*) [771]

Lacustrine formations of St. John, N.B. — As studied in the deposits of Lawlor's Lake, G. F. Mathew finds these to have begun about the middle of the terrace period, when the sea, which had previously submerged this portion of the coast to a depth of 200 feet, had so far shoaled as to bring up the land within 65 feet of its present level. During the interval between this epoch and the present time, a series of layers has been deposited, resting upon the marine Saxicava (or Macoma) sands below, and consisting, in succession, of lacustrine clays, lacustrine peat, peaty marl, and pure marl, to a depth of about 81 inches. From the character and relations of the deposits, together with the vegetable and animal remains which they contain, he finds it possible to trace out a number of successive phases in the lake-history of the region, accompanied, probably, by equally marked climatic differences. Among the plant-remains observed, the most interesting are those of the Characeae, of which particular descriptions, accompanied by figures, by Dr. T. F. Allen, are given. In addition to the spores of Chara, fragments of wood (some of them gnawed by the beaver), bark, cones of evergreen trees, bud-scales and leaves, and fruits of several species of land-plants, occur. A small fragment of charcoal was also found some distance below the surface, indicating, probably, the presence of man. The character of the plants is regarded as presenting a more northern facies than those dwelling in the same region to-day. The variations of the molluscan fauna attendant upon the changes in the condition of the lake are especially interesting, and have been made the subject of particular study by Prof. Hyatt. — (*Bull. nat. hist. soc. N.B.*) L. W. B. [772]

Lithology.

The Cheviot andesites and porphyrites. — The Cheviot district is composed largely of a series of quartzless eruptive rocks, to which the name 'porphyrite' is usually applied. They have a compact felsitic groundmass porphyritically enclosing numerous feldspars. The color is generally dark purple or red. They are much altered; and amygdaloidal varieties are found. In addition to the ordinary porphyrites, there occur masses of volcanic ash and breccia, and also a rock known as pitchstone porphyrite. These porphyrites have been described by Teall under the name 'andesites,' regarding them as more or less altered andesites.

Mr. Teall describes the mineral constituents as feldspar, pyroxene, magnetite or menacanthite (a glassy base containing various devitrification products), apatite, and hematite or biotite. The feldspars contain numerous inclusions of the base, and are principally plagioclase. The pyroxene is in elongated, octagonal, and irregular crystals and grains. The crystals are sometimes twinned, and he regards them as augites. The inclusions in the augite are glass cavities and colorless microlites. The groundmass is described as a 'felted aggregation of microlites in a glassy base.' The present writer has preferred to denominate this as a 'felty base.' The microlites of the felty base Teall regards principally as feldspar. The alteration products appear mainly to be siliceous. The age is stated to be 'post-silurian and pre-carboniferous.' Some specimens were later examined by Dr. H. Rosenbusch of Heidelberg, the leading European lithologist. He found that part of the pyroxenic constituent was orthorhombic, probably hypersthene, while the remainder is augite.

The constantly increasing discovery of other minerals besides augite, in the andesites, is leading, in the present system of nomenclature, to a series of distinct names for rocks structurally and chemically alike, and will probably in time cause the abandonment of the mineralogical nomenclature of rocks. In this case it should lead to the employment of the term 'andesite' alone. — (*Geol. mag.*, March, 1883.) M. E. W. [773]

GEOGRAPHY.

(Arctic.)

Northern notes. — Later advices have been received from the British party at Fort Rae. After experiencing a miniature shipwreck on Great Slave Lake, they arrived at Fort Rae in the latter part of August. Sept. 1, meteorological, and, two days later, magnetic observations were begun. Winter set in Nov. 1. The minimum temperature of the air to Nov. 30 was -43° C. The latitude of Fort Rae was determined to be 64° N., a degree farther north than previously supposed. Corrections in the position and shape of Great Slave Lake also seem necessary. The party were well, and work progressing favorably. They expect to return in October, 1883.

The plans of Baron Nordenskiöld for the present summer in Greenland have been in part made public. South-west Greenland is to be visited, and a study of the inland ice from that direction is contemplated. Later in the season, when the usual lane of water forms between the pack-ice and the south-east shore north from Cape Farewell, the party will proceed in *umiaks*, or sealskin canoes, as far as circumstances will admit, with the view of reaching, at the head of some of the fiords, the highlands which exist in east Greenland, and which are believed to be partly free from glaciers. Traces of the ancient Norse colonies at Öst-bygd are among the things to be sought for, though the present weight of evidence is in favor of the theory that these colonies were on the south rather than on the east coast, and that they are represented by the well-known stone ruins of south Greenland. — W. H. D. [774]

Siberian notes. — Number four of the quarterly *Ivestia* of the imperial geographical society for 1882 (printed 1883) contains an article by N. S. Shtukin on 'Popular traditions of eastern Siberia,' which contains much interesting matter, and some amusing instances of ideas associated by the residents with certain ancient monuments. Another by the same author is, 'An explanation of certain picture-writings on the cliffs of the Yenisei River.' These are figured, but are not particularly remarkable, except as being the work of invaders from the far south, perhaps Persians. Camels and pheasants are among the animals represented. U. V. Arsenieff discusses the consequences of early publications on, and explorations of, the Amur River. Bussé continues his valuable (separately paged) bibliography of the literature of the Amur region. The first edition of this bibliography, containing 522 titles, appeared in 1874. The present edition is brought down to 1881, the forty-eight pages already published including 973 titles. The work, which will probably be completed in the next number, is announced to contain, in all, 1,416 titles, divided under appropriate subjective subheads, but catalogued by authors. Of the proposed bibliographies of Hoevert and of the academy of sciences, nothing has lately been heard, which makes the result of private enterprise so much the more welcome. Bussé's titles are condensed, but sufficiently full for reference, and a large proportion refer to articles in Russian periodicals. — W. H. D. [775]

(Africa.)

Abbé Guyot on eastern Africa.—This enterprising missionary leader gives a summary of the difficulties encountered in entering Africa from Zanzibar in his several expeditions since 1879. His party included at times as many as six hundred persons, among whom brawls were very frequent, and desertion and robbery were prevented only by the strictest watch. In passing the numerous Ugogo villages, there was always delay and much palaver concerning the imposts collected of travelling parties. The fever presented the greatest danger. Sixteen of his thirty-five missionaries died of it in three years, and four more were killed by the negroes. Bad reports are spread by the Arabs about the Europeans, who are represented as woman-stealers and cannibals. The abbé bought and brought back with him four native children, who are now baptized and learning Latin, as preparation for the study of medicine; for as doctors they can exert the greatest influence. Guyot was considered a great magician, because he cured a native sorcerer who was unable to cure himself. It was hoped that the Louaha, flowing from the country east of the lakes to the ocean, might prove an easy means of communication with the interior; but it was found unnavigable. Large game was common, and gave plenty of food for cheap living for the caravans. The natives call 'gli, gli!' when hunting the hippopotamus; and, if within hearing, it rises from the shallow, muddy banks of the river, and comes towards them. This was tried many times, and always proved successful. The friendly native tribes are good-hearted; but they must be allowed their own peculiar ways, such as shouting and dancing all night to do honor to the white travellers to whom they had presented food. The abbé hopes soon to go to western Africa, and ascend the Kongo. — (*Comptes rendus soc. géogr. Paris*, 1883, 44.) w. m. d. [776]

Climate of the upper Senegal.—M. Colin, physician of Commandant Derrien's topographic party to the upper Senegal in 1880-81, divides the year there into a dry and a wet season, and two transition periods,—the dry season, from Nov. 15 or Dec. 1 to March 15, with nights and early morning hours cool, and days supportable; transition, from March 15 to May 15, still dry and healthy, but very warm and uncomfortable for Europeans; the rainy season, from May 15 to Oct. 15, cooler and often cloudy, without evaporation from the marshes, and hence still healthy; the second transition, from Oct. 15 to Nov. 15 or Dec. 1, still somewhat rainy, but with subsidence of rivers and drying of low plains, excessively unhealthy. — (*Comptes rendus soc. géogr. Paris*, 1883, 86.) w. m. d. [777]

Country of the upper Niger.—Commandant Gallieni's second paper gives many details on the hydrography and population of this region, and a few notes on its geology. The rocks are chiefly horizontal sandstones, showing barren plateaus, separated by fertile valleys, in which the streams are subject to rapid and regular floods, rising in June, and falling in December. The Niger is considered in three parts. The upper stream begins at the rocks of Sotuba, ten kilometres below Bamako, and extends through the broken country to its head waters, but even here probably in part navigable for small steamboats. The middle course includes the least-known part of the river from the rocks of Sotuba to the falls of Busa. Here the stream flows in numerous channels through a flat country, which it enriches. An active river-trade in slaves, cattle, gold, etc., is carried on between large villages on its banks. This division is more navigable than the first. The lower course

extends from the falls of Busa to the sea, and has often been ascended a considerable distance by trading-vessels. The total length is over 2,000 miles. Several of the towns described have well-constructed fortification walls, which are illustrated by plans and figures. On the assault of the village Gubanko in 1881, a hundred cannon-shot were needed to make a breach two or three metres wide. — (*Bull. soc. géogr. Paris*, 1882, 616.) w. m. d. [778]

BOTANY.

Cryptogams.

Ohio fungi.—In a paper on the Mycologic flora of the Miami valley, Mr. A. P. Morgan has given descriptions of eighty species of *Agaricus* belonging to the division *Leucospori*, found in south-western Ohio. The paper is accompanied by four colored plates, in which are figured six new species of *Agaricus*. — (*Journ. Cinc. soc. nat. hist.*, vi.) w. g. f. [779]

Diseases of trees.—The third part of the *Untersuchungen aus dem forstbotanischen institut* of Munich contains several articles on the diseases of woody plants caused by fungi. Dr. H. Mayr has a paper on the disease of maples, linden, and horse-chestnut, caused by *Nectria cinnabarina*. Prof. Robert Hartig describes a new species, *Rhizomorpha* (*Dematophora*) *necatrix*, which he considers to be the cause of the root-rot in grape-vines. The *Rhizomorpha* produces conidia, which are figured by Hartig; but he was unable to find ascospores of any kind. While recognizing that the root-rot is caused by a species of *Rhizomorpha*, he differs from Millardet and Frank, who consider that the *Rhizomorpha* is the same as *R. fragilis*, which develops into *Agaricus melleus*; and, on the other hand, he differs from Prillieux, Thuemen, and others, who attribute the rot to a growth of *Roesleria hypogaea*, which Hartig considers to be merely a saprophyte which occasionally develops on the diseased roots. Hartig calls attention to the fact that in Germany the white pine of the United States (*Pinus strobus*) is especially susceptible to fungous diseases, and mentions several destructive fungi which are prone to attack it: among others, he cites *Peridermium pini*. In this respect the experience of German mycologists does not agree with observations made in this country, where the white pine is apparently less liable than some other species to attacks of the *Peridermium*. — w. g. f. [780]

Insects and the spermogonia of Uredineae.—For several years Rathay has been studying the relations between the rust-fungi and certain insects which visit their spermogonia to feed upon the spermatia and a sugary excretion which is found with them. The fragrance of the spermogonia of a number of species—e.g., *Puccinia suaveolens* of the Canada thistle—has been noticed by everybody who has studied these fungi; and the brightly colored spots in which they occur is equally well known. What benefit the fungi derive from the visits of ants and other insects is still to be shown, and will probably remain a mystery until the true function of spermatia is understood; but there is some reason for believing that the color, fragrance, and sweet secretion of their spermogonia are designed, like the similar peculiarities of many phenogamic flowers, expressly to attract these visitors. — (*Denkschrift. wien. akad.*, xlv.) w. t. [781]

Phenogams.

Notes on Echinocactus.—Mr. Thomas Meehan announced the discovery of sensitive stamens in *Echinocactus Whipplei*. The motion of the stamens, when touched, was not instantaneous, several seconds

sometimes elapsing before the effect was observed. The flowers of this species are unable to expand to any great extent, on account of their short tube surrounded by strong and stiff spines. If the flowers could expand, as in *Opuntia*, and the stamens lie flat, as in that genus, the motion might be equal. As in *Opuntia*, the motion was not always up towards the pistil, but might be horizontal, to the left or to the right: there seemed to be no rule. The bending was from the base, as the filament retained a perfectly straight line during the movement. Mr. Meehan further remarked, that, in descriptions of cactaceous plants, the relative length of petals or stamens to the pistil was often given. He had observed, that in many species, near the period of the ejection of the pollen from the anther-cells, the stamens and style were of about equal length, but that the latter continued to grow after the maturity of the anthers, and, in *Echinocactus Whipplei*, would finally reach to near half an inch above. He had not been able to get any genera of Cactaceae to fruit under cultivation, except *Opuntia*, unless they were artificially pollenized. By the application of the flower's own pollen to the stigma, they usually perfected fruit. His specimens of *Echinocactus Whipplei* and *E. polyancistrus* had bright purple flowers, although the latter were usually described as yellow or greenish. — (*Acad. nat. sc. Philad.*; meeting April 10.) [782]

The relations of heat to the sexes of flowers. — Mr. Thomas Meehan remarked that he had observed that a few comparatively warm days in winter or early spring would bring the male flowers of monoecious plants to maturity, while the female flowers remained to advance only under a higher and more constant temperature. He believed this accounted for their frequent barrenness. Last spring the male flowers of a specimen of *Corylus avellana* were past maturity before the appearance of action in the female flower-buds. There were consequently no nuts on this tree last season. The present season was one of unusually low temperature, and the hazel-nut had not had its male blossoms brought prematurely forward. The male flowers were showing their anthers, while the female buds had their pretty purple stigmas protruding. He could therefore predict with confidence a full crop from the tree which the season before was barren. — (*Acad. nat. sc. Philad.*; meeting April 10.) [783]

(Systematic.)

Grasses. — Dr. Vasey proposes to publish, in connection with F. L. Scribner, a full catalogue of North-American grasses, and in a circular gives the names merely of twenty-nine new species and varieties, mainly based upon recent collections, but as yet unpublished. Mr. Scribner continues his list of the grasses of Pringle's collection in Arizona and California, giving descriptions of the less familiar species. He also describes a new *Poa* from the head waters of the Sacramento, and a viscid species of *Diplachne* from near Tucson; though of the latter he says, "It is not improbable that it has already been described in works not accessible." — (*Bull. Torr. bot. club*, March, 1883.) s. w. [784]

New ferns. — Mr. Lemmon's researches in the Huachuca Mountains, near the boundary-line in Arizona, add several species to the list of United-States ferns. Prof. Eaton describes five such species, previously known only from Mexico or farther south, — a *Polypodium*, a *Notholaena*, a *Pellaea*, a *Cheilanthes*, and two *Aspleniums*. He adds a new *Notholaena*, from California and Arizona, hitherto confused with *N. candida*, and notes the discovery of *Asple-*

nium montanum in Connecticut. — (*Bull. Torr. bot. club*, March, 1883.) s. w. [785]

Lythraceae. — Koehne concludes the strictly systematic portion of his monograph with the genus *Lagerstroemia*, of twenty-one species, chiefly of central Asia, China, and Japan (two native to Australia, and one in Madeira), and *Lawsonia*, of a single species, the 'Henna' of the orientals, widely cultivated in the tropics, but of uncertain origin. A discussion of the geographical distribution and of the morphology of the order is to follow. — (*Engler's bot. jahrb.*, March, 1883.) s. w. [786]

ZOOLOGY.

Protozoa.

Investigations on certain Protozoa. — Dr. August Gruber, the skilful observer of Protozoa, has published a memoir in which he describes two new salt-water rhizopods, and reports new observations on certain Infusoria, and the conjugation of Actinophrys. The first new rhizopod is named *Pachymyxa hystrix*. It is distinguished especially by an envelope composed of little rodlets, standing perpendicular to the surface. In this envelope are pores through which simple, not branching, lobate pseudopodia can be extended, as in a foraminifer. The animal can slowly alter its form. It is brown in color, and has in its interior numerous bodies which may be small nuclei. In the same aquarium a similar animal was observed, but which had no envelope. Gruber considers this second form as probably the same species in a different condition. The second new species, *Amoeba oblecta*, is very small (0.03–0.04 mm.). It builds itself a granular dome-shaped house. It has no contractile vacuole; but a nucleus may be brought out by reagents. As they move about little, they are usually found in colonies.

In part second (Infusoria) a new species (*S. guttula*) of *Spongomonas* is described. The minute round or oval flagellate animals live each in its tube; but the tubes are all united together to form a hollow sphere. Gruber suggests, that, as they occur in putrid water, they have gathered together around a bubble of oxygen, and so come to form a hollow colony. The genus *Stichotricha* is remarkable among hypotrichous Infusoria for forming a protective covering. Gruber describes several forms, which may be only varieties of *S. socialis*, besides another form, which he names *S. urnula*. It lives in a transparent, membranous, flask-shaped shell, has the characteristic ciliation of the genus, two oval nuclei, to be seen only in stained specimens, but no nucleoli were detected. Over the body are flexible cilia, capable of acting alternately as cilia and pseudopodia. The animals multiply by division; the two daughter-animals living a while in one shell, until one wanders forth, and forms a new shell, usually near by, so that a colony may be thus formed. Gruber also refers Kent's *Chaetospira* and Hudson's *Archimedeia* to *Stichotricha*.

Besides the usual fusion of two or many individual Actinophrys, Gruber has observed the fusion as rather absorption of a small Actinophrys without a nucleus by a big nucleated individual. There is no reason for believing that either form of fusion is concerned with reproduction. Finally the author advances some general considerations to show that the nucleus has no importance for those functions of the cell-body which stand in no direct relation to reproduction; namely, movement, assimilation, excretion, and growth. It may also be without influence on the external form. — (*Zeitschr. wiss. zool.*, xxxviii. 45.) c. s. m. [787]

Mollusks.

Large American pearls.—Some remarkably large pearls have been obtained, during the last fishing-season, at the fishery near La Paz, in the Gulf of California. One found in December,—the largest on record from this region,—weighing 75 carats, sold on the spot for \$14,000, and is considered to be worth much more. Another very perfect one, of 47 carats, is valued at \$5,000; and a third, at \$3,000. It is many years since such good fortune has attended the divers of this region, though the product of pearls of moderate size has been tolerably constant. — (*Mex. financiero*, Jan., 1883.) W. H. D. [788]

Ottawa Unionidae.—The researches of Mr. F. R. Latchford among the fresh-water mollusks of the vicinity of Ottawa have been fruitful of results. In 'Notes on Ottawa Unionidae,' he mentions fourteen species of the genus *Unio*, of which one (*U. borealis* Gray) is new, and apparently valid. There are also three species of *Margaritana*, and ten of *Anodonta*. Previously, only twelve species altogether had been recorded from this vicinity. The paper is full of interesting biographical details in regard to the species enumerated, and their varieties. The author notes the asymmetry of the embryos of *Unio* in *Anodonta fluviatilis*, *Unio luteolus*, and *U. borealis*, and infers it for Unionidae in general, though they have been described as perfectly symmetrical. A mite found in the gills of *A. fragilis*, and placed in the hands of Mr. Tyrrell for investigation, is as large as a pellet of buckshot. It appears that the lumbermen on the Chaudière eat these mollusks, and obtain them in an ingenious manner. Birch brushwood, tips down, is attached to the raft so as to drag gently over the bottom when in the shallows. The open bivalves feel the twigs passing over, close the valves on them, and hold fast. At intervals the brush is lifted, and the adhering 'clams' are picked off. — (*Trans. Ott. field nat. club*, no. 3.) W. H. D. [789]

Fossils of the Rizzolo clays.—Seguenza has just issued a brochure in regard to the clay deposits of Rizzolo, province of Syracuse, Sicily, with lists of the fossil mollusks found in them, which comprise two pteropods, fifty-five gasteropods, and sixty-eight lamellibranchs, many of which still live in adjacent waters. The deposit is considered by the author to be quaternary, and derives its interest particularly from the fact, that remains of the living African elephant (*E. africanus* Blum.) have been discovered in it, raising interesting questions as to the former range of that mammal. To the discussion of this branch of the question, and of the identity of the species, the paper is chiefly devoted. — W. H. D. [790]

Myriapods.

Devonian myriapods.—An interesting discovery has been made by B. N. Peach, in the lower old red sandstone of Scotland, of myriapods in rocks older than the carboniferous series, the lowest that have before this yielded them. Two species are described and excellently figured, one of which has long been known, and supposed to be a Crustacean, having been described by Page under the name of *Kampecaris forfarenensis*. They are of small size, and differ considerably from each other. *Kampecaris* is cylindrical, scarcely tapers at the head end, and is composed of numerous sub-equal alternately larger and smaller somites, each bearing a pair of legs. *Archidesmus* is depressed, fusiform, with alternately very unequally larger and smaller somites, each bearing a pair of 'six or seven jointed' spinous legs (none are shown in the figures attached to the smaller, intercalary

somites). It will be seen that they differ considerably from the known carboniferous myriapods. — (*Proc. roy. phys. soc. Edinb.*, vii. 177, pl.) [791]

Dermal appendages of *Polyxenus*.—The different forms of hairs in *P. fascicularis* are described and figured by Scudder; those upon the body-joints, *a*, *b*, varying from club-shaped spines, furnished with several rows of flattened teeth, to sabre-shaped spines, serrate on the convex side. The posterior extremity of the body is provided with a pair of cylindrical fascicles, resembling those of the larva of *Anthrenus*, but composed of very curiously-formed bristles, *c*, shaped like an elongated fish-hook, the shaft gently curved, and the tip recurved and apically barbed. The shaft is armed with delicate spinules, and the crook furnished on the concave side with a few spatulate, drooping appendages. These appendages are also figured, rather rudely, by Packard in the *Amer. nat.* for March. — (*Proc. Bost. soc. nat. hist.*, xxii. 67.) [792]

Insects.

The American species of swallow-tail butterflies.—As the result of the study of a large series of forms partly collected by himself in Washington Territory east of the Cascade Mountains,—a hitherto unexplored region,—Dr. Hagen concludes that *P. Zolicao*, *oregonius*, and *Alaska*, are all specifically inseparable from the old-world *P. Machaon*, the range of variation in which he also discusses. He also unites *P. Rutulus* and *Eurymedon*, and considers them a western form of *P. Turnus*. — (*Papilio*, ii. 149.) W. H. Edwards vigorously combats this view, so far as the first series is concerned (*Ibid.*, iii. 45, pl.). [793]

Wisconsin Lepidoptera.—The geological survey publishes a catalogue of Wisconsin Lepidoptera by Hoy, long known as an enthusiastic collector in that state. The title is a misnomer; for, besides the butterflies (99 sp.) and hawk-moths (52 sp.), the author only enumerates the Bombycidae (75 sp.) and Geometridae (109 sp.); the Noctuidae (388 sp.) being oddly placed in a separate list, and other groups wholly omitted. Not the slightest notes are appended, except in the first two groups, where an indication of the abundance of the species, in a single word, is usually given. With the exception of an occasional straggler from the south, the list contains nothing noteworthy. — (*Rep. geol. surv. Wisc.*, i.) [794]

Geographical origin of North-American Sphingidae.—Three proximate sources are found by Grote for our Sphingid fauna, which consists of about 93 species. Omitting *Sphinx*, which the author claims to belong to an older period of separation, 10 genera (32 sp.) are considered as descendants of a circumpolar pre-glacial fauna; 11 genera (26 sp.), accessions from the tropics; and 14 genera (20 sp.), of North-American origin peculiar to the continent. All the species of a genus (excl. *Sphinx*) are thus seen to have a common geographic origin. "The decisive element in our fauna does not come from the old world." — (*Amer. journ. sc.*, March.) [795]

VERTEBRATES.

(Physiology.)

Influence of the centre of deglutition on that of respiration.—Steiner calls attention to some generally overlooked researches which show that an act of swallowing is usually accompanied by a more or less marked respiration, and himself adds

some new facts. He finds, that, on stimulation of the central end of the superior laryngeal nerve in the rabbit, every resulting swallowing movement is accompanied by more or less marked inspiration and expiration, and that the respiratory muscle concerned is the diaphragm. He concludes that the two centres are so united by commissural fibres that every stimulation of the deglutition centre is associated with excitation of the respiratory. — (*Du Bois' archive*, 1883, 57.) H. N. M. [796]

Digestion with exclusion of the stomach. — Working on dogs, Ogata finds, that when food is directly placed in the duodenum, and all gastric (also salivary) secretion is kept out of the intestines, the animal can still digest many things well, so as to maintain its weight, and pass normal faeces. Certain foods, however (as connective tissue), need the preparatory action of the gastric acid in order that they may undergo normal digestion; others need a change in their surface, or decomposition into small fragments such as usually occurs in the stomach, in order that they may lie long enough in the intestine to be thoroughly dissolved. The stomach, therefore, gives the dog opportunity to use a wider range of substances for the satisfaction of its nutritive wants. The transformation of proteids into urea occurs more uniformly when the stomach is allowed to act. — (*Du Bois' archive*, 1883, 89.) H. N. M. [797]

Influence of carbon-monoxide poisoning on trypsin. — Podolinski has found that the transformation of pancreatic trypsinogen into trypsin is associated with the assumption of oxygen. Herzen finds that the pancreatic infusion of dogs killed by carbon-monoxide gas, which infusion, under normal circumstances, would have contained much trypsin, possesses hardly any. He concludes that either the absence of oxygen from the blood has led to a reconversion of trypsin into trypsinogen, or that trypsin forms with carbon monoxide a compound which is not proteolytic. — (*Pflüg. archive*, xxx. 308.) H. N. M. [798]

Reptiles.

The physiological action of Heloderma poison. — That this lizard, the Gila monster (*Heloderma suspectum*), is venomous, has been often asserted and as often denied. Weir Mitchell and Reichert find that its mouth-liquids are highly poisonous, killing frogs, pigeons, and rabbits in a few minutes. This establishes it as the only venomous lizard known. What is of even more interest, perhaps, is the fact that the physiological action of the poison is quite different from that of snake-poison: the latter kills essentially by paralyzing the respiratory centre, the former by paralyzing the heart. *Heloderma* venom causes no local injury when injected subcutaneously; and arrests the heart in diastole, from which condition the organ slowly passes into a contracted state. The heart-muscle entirely loses its irritability when the organ ceases to beat, and when other muscles and the nerves still readily respond to stimulation. The spinal cord is paralyzed. — (*Medical news*, Feb. 10.) H. N. M. [799]

Relations of the Mosasauridae. — M. Dollo, assistant naturalist to the royal natural history museum of Brussels, separates the *Mosasaurus Maximiliani* of Goldfuss generically from the *M. Camperi*, under the designation *Pterycollasaurus*. In this new genus the pterygoids are united along two-thirds of their entire length, especially in the dentary portion, whereas in the typical *Mosasaurus* they are entirely separate. This last is also the case with the American genera *Tylosaurus*, *Lestosaurus*, *Holosaurus*. In another new genus now indicated, *Plioplatecarpus*

(*P. Marshii*), which appears to be closely related to *Leiodon* and *Lestosaurus*, and of which fragments are contained in the museum of Brussels, the author indicates the presence of a sacrum composed of two united vertebrae having the same disposition as the similar parts in the pelvic girdle in the iguana and monitor. From the presence of this sacrum, M. Dollo concludes, in opposition to the views of Prof. Cope (who, under the name of the *Pythonomorpha*, approximates these animals to the serpents), that the mosasauroids were true lacertilians, and that they held a place among these similar to that occupied by the pinnipeds among the carnivora. — (*Bull. mus. royal Belg.*, i. 55.) A. H. [800]

Mammals.

The bunotherian mammals. — Professor E. D. Cope defines the Bunotheria as resembling in most technical characters the Edentata and the Rodentia. Their enamel-covered teeth, however, separate them from the former, while the articulation of the lower jaw is different from that found in the latter. This is a transverse ginglymus with a posterior process in the Bunotheria, as distinguished from the longitudinal groove permitting antero-posterior motion of the Rodentia.

After dwelling on the characters of the related forms, and pointing out the inconsistencies of the present classification, he defined the five suborders as follows:—

- I. Incisor teeth growing from persistent pulps.
Canines also growing from long persistent pulps, agreeing with external incisors in having molariform crowns I. Taeniodonta.
Canines rudimental or wanting; hallux not opposable II. Tillodontia.
Canines none; hallux opposable.

III. Daubentonioidea.

- II. Incisors not growing from persistent pulps.
Superior true molars quadrituberculate; hallux opposable IV. Prosimiæ.
Superior true molars quadrituberculate; hallux not opposable V. Insectivora.
Superior true molars trituberculate; hallux not opposable VI. Creodonta.

It was possible that the group which he had called the Mesodonta may yet be distinguished from the Insectivora by characters now unknown. But he could not admit any affinity between this group and any form of pachyderms, as suggested by Filhol, or of Suillines as believed by Lyddeker, as such suppositions are directly opposed to what we know of the phylogeny of the mammalia. These views are apparently suggested by the bunodont type of teeth found in various Mesodonta; but that character gives little ground for systematic determination among Eocene mammalia, and has deceived paleontologists from the days of Cuvier to the present time. The only connecting-point where there may be a doubt as to the ungulate or unguculate type of a mammal is the family Periprychidae of the suborder Condylarthra. The suborder Hyracoidea may furnish another index of convergence.

He had at one time called this order by the name Insectivora, a course which some zoologists may prefer. A name, however, should as nearly as possible adhere to a group to which it was first applied, and whose definition has become currently associated with it. Such an application is a material aid to the memory. There are various precedents for the adoption of a new general term for a group composed of subordinate divisions which have themselves already received names. — (*Acad. nat. sc. Philad.*; meeting April 3.) [801]

ANTHROPOLOGY.

Are the stone graves modern?—Throughout Kentucky, Tennessee, and other sections draining into the Ohio, the aborigines, at some former period, buried their dead in stone boxes or cists, made of thin slabs of limestone, and other rock. There are those who maintain that this form of burial was practised by a highly cultured race of people, who passed away before our modern Indians set foot in that country. Dr. Charles Rau, in a paper before the American association at Montreal, gave an account of graves opened by Dr. Wislizenus, in Randolph County, Ill., containing both of Dr. Morton's types of North-Americans, — the Toltec, and the true American. Dr. H. Shoemaker opened a stone grave, in Monroe County, Ill., which contained the remains of a Kickapoo Indian. Dr. Rau concludes that the stone graves owe their origin to the race inhabiting within historic times, or even earlier, the district where they are found. — (*Amer. nat.*, Feb.) J. W. P. [802]

Cup-shaped sculpture.—One of the enigmas of the stone age is the occurrence of cup-shaped cuttings, singly or in groups, from the size of a half-bullet upwards, upon small, movable bowlders, as well as upon large stationary rocks. Dr. Rau, in his paper on "Cup-shaped and other lapidarian sculpture in the old world and in America," has ransacked the literature of Great Britain, France, Switzerland, Germany, Scandinavia, and India, for old-world examples. Many of these are very elaborately carved and encircled, giving evidence of connection with ancient mystic rites. The American specimens are much ruder; and the cautious author is disinclined to attribute to them the same mystery that hangs over those in the eastern world. — (*Contr. N. A. ethnol.*, v.) O. T. M. [803]

EGYPTOLOGY.

The Fayoum.—The good work done by Mr. Cope Whitehouse (*Rev. archéol.*, Juin, 1882; *Bull. Amer. geogr. soc.*, 1882, No. 2) on the boundaries of the ancient Lake Moeris is to be supplemented by further researches into the formation of the pyramids, and the possibilities of irrigation in the Fayoum. Mr. Whitehouse is now in Cairo; and, with the aid of government surveyors, he hopes to verify his theories, which have been somewhat misunderstood. — (*Athenaeum*, March 24.) H. O. [804]

Ancient Egyptian economy.—Broken crockery was not entirely lost to the Egyptian, for he saved the pieces to have inscribed on them the tax-gatherer's

receipts. Immense numbers of these inscribed fragments have been found; and, from the collection in the British museum, Dr. Birch has given a series of translations, showing the tax in Egypt under the early Caesars. — (*Proc. soc. bibl. arch.*, March 6.) H. O. [805]

New discoveries.—This year promises large results in new discoveries. The director of the Boolak museum, Maspero, though with scanty means, has made great progress in new work. He has obtained a royal sarcophagus of the twenty-fifth dynasty, and several valuable mummies. He has also found an Egyptian crypt containing an early Coptic church, with all its ecclesiastical furniture intact. — (*Academy*, March 24.) H. O. [806]

Work in progress.—The mural decorations of the tomb of Seti I. (Belzoni's tomb) at Bab-el-Molook are now being copied by Lefébure, Loret, and Bourgoin, members of the French college of archeology at Cairo. The temple of Luxor is to be excavated in the autumn. Maspero is to resume the excavation of the pyramid at Lisht in May. — (*Academy*, March 24.) H. O. [807]

EARLY INSTITUTIONS.

Manumissions at four roads.—F. E. Warren finds proof, in the Leofric missal, — a X.-XI. cent. MS. preserved at the Bodleian in Oxford, — of the existence, in England, of the custom of manumitting slaves at places where four roads meet (*on feower wegass*). The passage is given in full from the MS. — (*Rev. cel.*, Jan., 1882. Cf. *Rep. Devonsh. ass. adv. sc.*, viii. 417, 1876.) D. W. R. [808]

Ostracism.—M. Houssaye gives a brief history of ostracism as it obtained in Athens and other Greek cities and colonies, *à propos* of the effort to introduce something like it in France. — (*Rev. deux mondes*, 15 Fév.) D. W. R. [809]

Moslem property-law.—Baron von Tornaau writes at length upon this subject. It has been generally maintained, in regard to the land in Moslem countries, that it has been the common property of the people (*der moslemischen religionsgenossenschaft*); that the individual has had no real right of property in it, only a usufruct (*nutzungsrecht*). The writer attempts to show, that according to the Koran, according to tradition, and according to the law-books (*scheriätbüchern*), private property in land, in the fullest sense of the term (*volles eisenhumsrecht auf grund und boden*), existed everywhere. The writer gives a list of sources (34 titles). — (*Zeitschr. deutsch. morgenl. gesellsch.*, xxxvi. ii.) D. W. R. [810]

INTELLIGENCE FROM AMERICAN SCIENTIFIC STATIONS.

PUBLIC AND PRIVATE INSTITUTIONS.

Peabody museum of American archaeology, Cambridge, Mass.

The ancient cemetery at Madisonville, O.—In his recent explorations in connection with Dr. G. L. Metz, Mr. Putnam made extensive researches at this place. Near the cemetery are several earth-circles, from forty-three to fifty-eight feet in diameter. Trenches run through four of them revealed in the centre of two, on the clay bottom, beds of ashes in which were potsherds, flint-flakes, and burnt bones, with a perforated clam-shell. In the trench, on the clay, there were found a rudely chipped stone hoe, a rude stone axe with a groove, a split pebble, a fragment of a stone gorget, worked antler-tips, and several rude

arrow-points. The results of the examination of these circles proved them to be the sites of habitations, over which from one to two feet of leaf-mould has formed since the central fires were deserted and the circular structures fell from decay. The few things found within the circles, and the abundance of household utensils, implements, and refuse, found in the ash-pits, suggest the possibility, that on special occasions all the articles in the house, with ornaments, implements, and other personal objects, were partly destroyed by fire, and the remnants, being gathered up with the ashes, were deposited in a pit dug for the purpose; while the great number of broken bones of various animals, mixed with the ashes, indicates that at such times feasts were held. Such a custom would